



State of art review on PP-band retrofitting for masonry structures

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Abstract

Experience from earthquakes has shown that the collapse of unreinforced masonry structures causes a larger number of loss of life during these events in developing countries. Therefore, there is an urgent need to improve their seismic performance to reduce future fatalities and to protect the existing housing stock. To effectively promote seismic retrofitting, inexpensive and simple technical solutions are required. Because in many regions self-construction is predominant, it is expected that any retrofitting initiative will also be taken by the house resident. Consequently, it is also important that the retrofitting procedure does not require highly skilled labor. Polypropylene band (PP-band) retrofitting method satisfies these two key requirements. PP-bands are commonly used for packing, which is inexpensive, worldwide available and durable. This paper focuses on reviewing the PP-band seismic retrofitting considering tests conducted to evaluate the efficiency of the retrofitting method, factors affecting the retrofitting, promotion technique, limitation and feature research focus of the PP-band retrofitting method.

Keywords PP-band · Masonry · Earthquake · Retrofitting · Residual strength

Introduction

Masonry is one of the oldest and most used construction materials in developing countries. Also, to get long-lasting architectural appearance people are used to construct masonry structures. The main problem in unreinforced masonry structures is its vulnerability against seismic loads. Past earthquakes have provided enough evidence that many such buildings are seismic vulnerable and therefore an even moderate earthquake can result in massive death and casualties.

Therefore, to decrease the casualty toll due to the earthquake, it is understood that it is the most important to promote earthquake-proof reinforcement to the building regardless of new and old buildings. Although various earthquake-proof technologies had been developed so far as shown in Fig. 1, basically only a few technologies for the poorest segment of the population of the developing countries [1–10]. Therefore, such developed technologies are not an available measure that can be adopted locally in developing countries. In developing a new seismic retrofitting

technology for a target region, it is important to consider various aspects such as; availability and prices of materials, people's lifestyle, culture, religion, etc... Table 1 presents the advantage, limitation, seismic safety, construction complexity, suitable building type and cost comparison of various retrofitting methods [3–6, 8–18].

The promotion of a retrofitting method is possible only if the technique considers issues of economical affordability and social acceptability together with technical feasibility. Among them, the PP-band retrofitting method enhanced the seismic resistance capacity of the building model significantly although PP-band was not used as retrofitting material in actual construction yet. It is especially suitable for the non-engineered structures because of the simple and easy technique in both to construct new retrofitting structures and to repair the existing structures.

The simple, earthquake-proof reinforcement technology by the PP-band that is reviewed in this paper is an earthquake-proof, retrofitting technology of the house using the band made of the polymer resin (polypropylene band/PP-band) that is in general widely being used for packing. The mesh covering the wall and the roof could prevent falling down units such as the adobe, stones, and the bricks from bearing wall, which would keep the structural integrity of the whole building during an earthquake. It is the

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